

REMARKS

Claims 1 to 12, 15, 16, 18 to 29 are pending in the present application

Applicants wish to thank Examiner Nguyen for conducting a personal telephone interview with their attorney, Paul D. Greeley, on April 24, 2003. During that telephone interview the three Japanese Patent references JP5088177 to Yasushi (hereinafter "the Yasushi patent"), JP10148827 to Hiroshi et al. (hereinafter "the Hiroshi et al. patent"), and JP 2211422 to Masahiro (hereinafter "the Masahiro patent") were discussed.

Examiner Nguyen indicated therein that claims 1 to 12, 15, 16, 18, and 19 were patentably distinguishable over the Hiroshi et al. patent in that the Hiroshi et al. patent uses an inorganic film, such as silicon dioxide, or an organic film formed on the surface of the metal film to obtain uniform thickness of the liquid crystal layer. The metal film and the roughness thereon do not come into contact with the liquid crystal material. The inorganic film/organic film layer forms a planar surface which is in contact with the liquid crystal material. This inorganic/organic film layer is responsible for the liquid crystal alignment. There is no alignment effect from the roughness of the thin metal film.

Examiner Nguyen further indicated therein that Figures 4, 8, 9, and 10 appear to have patentable subject matter. New claims 20 and 22 to 29 recite preferred features in accordance with Figures 4, 8, 9, and 10, as suggested by the Examiner.

Examiner Nguyen still further indicated that the features of the Yasushi patent are a monograting and thus one-dimensional in the plane of the cell wall. However, the Examiner expressed a concern that the triangular perturbations

protruding from the substrate surface in the Yasushi patent could be interpreted to have a second dimension perpendicular to the surface.

Examiner Nguyen yet still further indicated that the features of the Masahiro patent and the features of the present claims appear to both be capable of being formed of the same material and therefore could potentially have the same effect on visual angle. The Examiner indicated that the ruggedness provided to the surface of the lower electrode substrate in the Masahiro patent could be interpreted as a two dimensional array of upstanding features.

The accompanying Declaration under 37 C.F.R. § 1.132 and the discussion below addresses these concerns of the examiner.

Claim 1 now recites electrodes for applying an electric field across at least some of said liquid crystal material. The "at least some of" is as originally filed.

Claim 18 now recites said array of upstanding features is not treated with or formed from a material which will induce local homeotropic alignment of said liquid crystal material. Support for the array of upstanding features not being treated with or formed from a material which will induce local homeotropic alignment of said liquid crystal material is at least found at lines 6 to 9 of page 9. This passage states that "the liquid crystal molecules can be induced to adopt a state in which the director is substantially parallel to the plane of the local surface of the posts." It would be clear to a person skilled in the art of liquid crystal display technology, on consideration of the drawings and the accompanying description, that this substantially parallel local alignment is consistent only with the upstanding features not being treated with or formed from a material which will induce local homeotropic alignment (i.e., wherein the liquid crystal molecules are perpendicular to the plane of the local surface).

Claims 20 to 29 have been added. Claim 21 corresponds to the amended claim 18. Claims 20 and 22 to 29 recite preferred features in accordance with Figures 4, 8, 9, and 10, as suggested by the Examiner in a Telephone Interview on April 24, 2003.

Claim 15 is objected to because a claim of a method should not depend on the claim of a device. Applicants respectfully submit that claim 15 no longer depends from a claim of a device.

Claims 1 to 8, 10 to 12, 15, 16, 18, and 19 are rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent No. JP5088177 to Yasushi (hereinafter "the Yasushi patent").

The Yasushi patent is directed to a liquid crystal device having periodic or non-periodic rugged patterns which are respectively asymmetric in the sectional shape or the ruggedness and which are formed by a chemical treatment on the surfaces of the substrates. Each substrate part is a laminate of a substrate; an indium tin oxide (ITO) film or other transparent conductive film (transparent electrode); and an orientation film. The surface of the orientation film is treated to form periodic or non-periodic concave and convex shaped patterns where the cross section shape of each concave and convex shape is asymmetrical. These concave and convex shaped patterns define parallel walls of asymmetric shape that run the length of the display with corresponding parallel grooves of asymmetric shape between the walls.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of a first cell wall providing a desired alignment to molecules of the liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and oriented to produce the desired alignment, as in claim 1. In

particular, the features of the Yasushi patent are parallel walls and grooves that form a one-dimensional array. As the accompanying Declaration of Stephen Christopher Kitson reports, "Yasushi does not involve a two-dimensional array of upstanding features, but rather a conventional one-dimensional array in common with other prior art alignment means." The arrangement of this one-dimensional array "can be defined with reference to the position of each wall along a single axis on the surface of the substrate.... in clear distinction from Yasushi, the present invention uses an array of features which cannot be defined with reference to the position of each feature on a single axis, but only with reference to two axis." The array, or positioning of the features, of claim 1 is two dimensional. The vertical dimension perpendicular to the cell wall does not define the positioning of the features or the array of the features. Since the array of walls and grooves of the Yasushi patent is defined by only one dimension with respect to the plane of the cell wall, the Yasushi patent fails to disclose or suggest the two dimensional *array* of upstanding features, as in claim 1. Therefore, Applicants respectfully submit that claim 1 is patentably distinguishable over the Yasushi patent.

Applicants respectfully submit that claims 2 through 12, and 16 which depend from claim 1 are also patentably distinguishable over the cited art for at least the reasons discussed above in relation to claim 1.

Claim 3 adds the feature that the inner surface of the second wall is treated to produce a locally homeotropic alignment of the liquid crystal material, whereby the cell functions in a hybrid aligned nematic mode.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest an inner surface of a second wall being treated to produce a locally homeotropic alignment of the liquid crystal material, whereby the cell functions in a hybrid aligned nematic mode, as in claim 3. Homeotropic alignment is where the director is substantially perpendicular to the plane of the cell walls (see page

1, lines 23 to 25 of the present application). Hybrid aligned nematic mode (HAN) occurs when "one wall is treated to align a nematic LC in a homeotropic alignment and the other wall is treated to induce a planar alignment (see page 2, lines 25 to 27. The Yasushi patent does not disclose or suggest homeotropic alignment. As the accompanying Declaration of Stephen Christopher Kitson reports, "Yasushi does not disclose means for achieving homeotropic alignment." Further, since HAN mode requires that one wall of the liquid crystal cell be treated to align a nematic LC in a homeotropic alignment, the Yasushi et al. patent does not disclose or suggest a cell functioning in hybrid aligned nematic mode, as in claim 3. Therefore, claim 3 is further patentably distinguishable over the cited art.

Claim 5 adds the feature that the geometry and spacing of the features is such as to cause the liquid crystal material to adopt a locally homeotropic alignment.

Applicants respectfully submit that, as discussed above with respect to claim 3, the Yasushi patent fails to disclose or suggest liquid crystal material adopting a locally homeotropic alignment, as in claim 5. Therefore, claim 5 is further patentably distinguishable over the cited art.

Claim 7 adds the feature that the features are at least one of shaped and oriented to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a plurality of azimuthal directions.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest features that are at least one of shaped and oriented to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a plurality of azimuthal directions. In particular, the Yasushi patent fails to disclose or suggest liquid crystal director in a plurality of azimuthal directions. Therefore, claim 7 is further patentably distinguishable over the cited art.

Claim 8 adds the feature that the features comprise posts which are tilted with respect to the normal to the plane of the first cell wall.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest features comprising posts which are tilted with respect to the normal to the plane of the first cell wall. In particular the Yasushi patent fails to disclose or suggest posts. The features of the Yasushi patent are walls and grooves that run the length of the display. They are not posts. Therefore, claim 8 is further patentably distinguishable over the cited art.

Claim 10 adds the feature that the features are at least one of different height, different shape, different tilt and different orientation in different regions of the device.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest features that are at least one of different height, different shape, different tilt and different orientation in different regions of the device. Although the Yasushi patent may disclose varying the cycle, height of the convex part, asymmetry, and inclination of the features from one device to another (see paragraph 0026), the Yasushi patent does not disclose or suggest differing the height, shape, tilt, or orientation of the features, as in claim 10. Therefore, claim 10 is further patentably distinguishable over the cited art.

Claim 11 adds the feature that the features comprise posts, and wherein a tilt angle and orientation of the posts are uniform throughout the device.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest features comprising posts, and wherein a tilt angle and orientation of the posts are uniform throughout the device. As discussed above with respect to claim 8, the Yasushi patent does not disclose or suggest posts, let alone posts of

a uniform tilt angle and orientation, as in claim 11. Therefore, claim 11 is further patentably distinguishable over the cited art.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest a surface alignment structure on one surface of a wall for aligning the director of a liquid crystal material, the surface alignment structure comprising one of a random or pseudorandom two dimensional array of upstanding features which are at least one of shaped and orientated to produce the desired alignment, as in claim 15. As discussed above with respect to claim 1, the Yasushi patent does not disclose or suggest a two dimensional array of upstanding features. For at least the reasons discussed above with respect to claim 1, claim 15 is patentably distinguishable over the prior art.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of said first cell wall providing a desired alignment to molecules of said liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and orientated to produce said desired alignment, and wherein the array of upstanding features is not treated with or formed from a material which will induce local homeotropic alignment of said liquid crystal material, as in claim 18. As discussed above with respect to claim 1, the Yasushi patent fails to disclose or suggest a two dimensional array of upstanding features. Further, the Yasushi patent fails to disclose or suggest that such features not be treated with or formed from a material which will induce a local homeotropic alignment of the liquid crystal material. Therefore, claim 18 is patentably distinguishable over the cited art.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of at least said first cell wall providing a desired alignment to molecules of said liquid crystal

material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and orientated to produce said desired alignment, and wherein the molecules, when adjacent to the cell wall surface between the features, adopt an alignment which is one of planar and tilted planar, as in claim 19. As discussed above with respect to claim 1, the Yasushi patent fails to disclose or suggest a two dimensional array of upstanding features. Further, the Yasushi patent fails to disclose or suggest that when the molecules are adjacent to the cell wall surfaces between such features, the molecules adopt an alignment which is one of planar and tilted planar. Therefore, claim 19 is patentably distinguishable over the cited art.

Claims 1 to 8, 10 to 12, 15, 16, 18, and 19 are rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent No. JP10148827 to Hiroshi (hereinafter "the Hiroshi patent").

The Hiroshi patent is directed to a device in which light is well scattered by a reflecting layer. A thin metal film is formed on the inner surface of a substrate. The surface of the substrate is finely roughened so that the surface of the metal film is made rough. An inorganic film such as SiO₂ or an organic film is formed on the surface of the metal film to obtain uniform thickness of the liquid crystal layer.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of a first cell wall providing a desired alignment to molecules of the liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and oriented to produce the desired alignment, as in claim 1. In particular, the roughened surface of the metal film in the Hiroshi patent does not come into contact with the liquid crystal material. The inorganic or organic film

that is formed on the surface of the metal film provides a uniform, i.e. flat, surface in which the liquid crystal material comes into contact. As the accompanying Declaration of Stephen Christopher Kitson reports, "Hiroshi provides for an inorganic film such as silicon oxide or an organic film to be formed on the roughened surface of the metal reflector. Thus, the film 'fills in the dips,' and the roughness of the metal reflector is not 'experienced' by the liquid crystal molecules." The Hiroshi patent does not disclose or suggest a surface alignment structure comprising an array of upstanding features, the surface alignment structure providing a desired alignment, let alone a surface alignment structure that comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and oriented to produce the desired alignment, as in claim 1. Therefore, Applicants respectfully submit that claim 1 is patentably distinguishable over the cited art.

Applicants respectfully submit that claims 2 through 12, and 16 which depend from claim 1 are also patentably distinguishable over the cited art for at least the reasons discussed above in relation to claim 1.

Claim 2 adds the feature that the geometry and spacing of the features is such as to cause the liquid crystal material to adopt at least one of a locally planar or tilted planar alignment.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest features having geometry and spacing such as to cause the liquid crystal material to adopt at least one of a locally planar or tilted planar alignment. As discussed above with respect to claim 1, the Hiroshi patent does not disclose an alignment structure comprised of upstanding features. Therefore, the Hiroshi patent does not have features with geometry and spacing such as to cause the liquid crystal material to adopt at least one of a locally planar or tilted planar alignment. Accordingly, claim 2 is further patentably distinguishable over the cited art.

Claim 3 adds the feature that the inner surface of the second wall is treated to produce a locally homeotropic alignment of the liquid crystal material, whereby the cell functions in a hybrid aligned nematic mode.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest an inner surface of a second wall being treated to produce a locally homeotropic alignment of the liquid crystal material, whereby the cell functions in a hybrid aligned nematic mode, as in claim 3. Specifically, the Hiroshi patent does not disclose or suggest homeotropic alignment of the liquid crystal material. Therefore, claim 3 is further patentably distinguishable over the cited art.

Claim 4 adds the feature that the inner surface of a second cell wall is treated to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall, whereby the cell functions in a TN mode.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest an inner surface of a second cell wall is treated to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall, whereby the cell functions in a TN mode, as in claim 4. The Hiroshi patent describes rubbing processing of the macromolecule organic thin films that are formed on the metal films on one cell wall substrate. The Hiroshi patent does not disclose or suggest treating the second cell wall in any fashion, let alone to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall or a cell functioning in a TN mode, as in claim 4. Therefore, claim 4 is further patentably distinguishable over the cited art.

Claim 5 adds the feature that the geometry and spacing of the features is such as to cause the liquid crystal material to adopt a locally homeotropic alignment.

Applicants respectfully submit that, as discussed above with respect to claim 3, the Hiroshi patent fails to disclose or suggest liquid crystal material adopting a locally homeotropic alignment, let alone such an alignment caused by the geometry and spacing of upstanding features, as in claim 5. Therefore, claim 5 is further patentably distinguishable over the cited art.

Claim 6 adds the feature that the features are at least one of shaped and orientated so as to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a single azimuthal direction.

Applicants respectfully submit that the Hiroshi patent does not disclose or suggest features that are at least one of shaped and orientated so as to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a single azimuthal direction, as in claim 6. As discussed above with respect to claim 1, the Hiroshi patent does not disclose upstanding features, let alone features that are at least one of shaped and orientated so as to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a single azimuthal direction, as in claim 6. Therefore, claim 6 is further patentably distinguishable over the cited art.

Claim 7 adds the feature that the features are at least one of shaped and oriented to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a plurality of azimuthal directions.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest features that are at least one of shaped and oriented to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director

in a plurality of azimuthal directions. Similar to as in claim 6, the Hiroshi patent fails to disclose or suggest features such as those in claim 7 which produce the specified alignment in a plurality of azimuthal directions. Therefore, claim 7 is further patentably distinguishable over the cited art.

Claim 8 adds the feature that the features comprise posts which are tilted with respect to the normal to the plane of the first cell wall.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest features comprising posts which are tilted with respect to the normal to the plane of the first cell wall. The Hiroshi patent fails to disclose or suggest upstanding features, let alone features comprising posts, as in claim 8. Therefore, claim 8 is further patentably distinguishable over the cited art.

Claim 10 adds the feature that the features are at least one of different height, different shape, different tilt and different orientation in different regions of the device.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest features that are at least one of different height, different shape, different tilt and different orientation in different regions of the device. As discussed above with respect to claim 1, the Hiroshi patent fails to disclose or suggest upstanding features, let alone features as described in claim 10. Therefore, claim 10 is further patentably distinguishable over the cited art.

Claim 11 adds the feature that the features comprise posts, and wherein a tilt angle and orientation of the posts are uniform throughout the device.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest features comprising posts, and wherein a tilt angle and orientation of the posts are uniform throughout the device. As discussed above with respect to

claim 8, the Hiroshi patent does not disclose or suggest posts, let alone posts of a uniform tilt angle and orientation, as in claim 11. Therefore, claim 11 is further patentably distinguishable over the cited art.

Applicants respectfully submit that the Hiroshi patent fails to disclose a surface alignment structure on one surface of a wall for aligning the director of a liquid crystal material, the surface alignment structure comprising one of a random or pseudorandom two dimensional array of upstanding features which are at least one of shaped and orientated to produce the desired alignment, as in claim 15. As discussed above with respect to claim 1, the Hiroshi patent does not disclose or suggest a surface alignment structure comprising upstanding features. For at least the reasons discussed above with respect to claim 1, claim 15 is patentably distinguishable over the prior art.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of said first cell wall providing a desired alignment to molecules of said liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and orientated to produce said desired alignment, and wherein the array of upstanding features is not treated with or formed from a material which will induce local homeotropic alignment of said liquid crystal material, as in claim 18. As discussed above with respect to claim 1, the Hiroshi patent fails to disclose or suggest a surface alignment structure comprising upstanding features. Further, the Hiroshi patent fails to disclose or suggest that such features not be treated with or formed from a material which will induce a local homeotropic alignment of the liquid crystal material. Therefore, claim 18 is patentably distinguishable over the cited art.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of at least

said first cell wall providing a desired alignment to molecules of said liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and orientated to produce said desired alignment, and wherein the molecules, when adjacent to the cell wall surface between the features, adopt an alignment which is one of planar and tilted planar, as in claim 19. As discussed above with respect to claim 1, the Hiroshi patent fails to disclose or suggest a surface alignment structure comprising upstanding features. Further, the Hiroshi patent fails to disclose or suggest that when the molecules are adjacent to the cell wall surfaces between such features, the molecules adopt an alignment which is one of planar and tilted planar. Therefore, claim 19 is patentably distinguishable over the cited art.

Claims 1 to 8, 10 to 12, 15, 16, 18, and 19 are rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent No. JP2211422 to Masahiro (hereinafter "the Masahiro patent").

The Masahiro patent is directed to a substrate having a surface which is formed into a ruggedness by etching using hydrofluoric acid. An ITO film is formed on the surface and the film is subjected to an orientation treatment.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of said first cell wall providing a desired alignment to molecules of said liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and orientated to produce said desired alignment, as in claim 1. More particularly, the Masahiro patent fails to disclose or suggest upstanding features that are at least one of shaped and oriented to produce a desired alignment. As the accompanying Declaration of Stephen Christopher Kitson reports, "the roughness in Masahiro is used to randomize the thickness of the layer and not to

produce a desired alignment of the liquid crystal material. ... Masahiro does not describe or suggest that the roughened surface provides an orientation effect on the liquid crystal material." In fact, as the Declaration points out, it is the orientation treatment over the ITO film that provides the alignment of the liquid crystal material. There is no indication in the Masahiro patent that the roughness does or is capable of producing a desired alignment of the liquid crystal material as in claim 1. Therefore, Applicants respectfully submit that claim 1 is patentably distinguishable over the cited art.

Applicants respectfully submit that claims 2 through 12, and 16 which depend from claim 1 are also patentably distinguishable over the cited art for at least the reasons discussed above in relation to claim 1.

Claim 2 adds the feature that the geometry and spacing of the features is such as to cause the liquid crystal material to adopt at least one of a locally planar or tilted planar alignment.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest features having geometry and spacing such as to cause the liquid crystal material to adopt at least one of a locally planar or tilted planar alignment. As discussed above with respect to claim 1, the Masahiro patent does not disclose or suggest upstanding features that produce a desired alignment. Therefore, the Masahiro patent does not have such features with geometry and spacing such as to cause the liquid crystal material to adopt at least one of a locally planar or tilted planar alignment. Accordingly, claim 2 is further patentably distinguishable over the cited art.

Claim 3 adds the feature that the inner surface of the second wall is treated to produce a locally homeotropic alignment of the liquid crystal material, whereby the cell functions in a hybrid aligned nematic mode.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest an inner surface of a second wall being treated to produce a locally homeotropic alignment of the liquid crystal material, whereby the cell functions in a hybrid aligned nematic mode, as in claim 3. Specifically, the Masahiro patent does not disclose or suggest homeotropic alignment of the liquid crystal material. Therefore, claim 3 is further patentably distinguishable over the cited art.

Claim 4 adds the feature that the inner surface of a second cell wall is treated to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall, whereby the cell functions in a TN mode.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest an inner surface of a second cell wall is treated to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall, whereby the cell functions in a TN mode, as in claim 4. The Masahiro patent describes applying an orientation treatment to the ITO film on one substrate. The Masahiro patent does not disclose or suggest treating the second cell wall in any fashion, let alone to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall or a cell functioning in a TN mode, as in claim 4. Therefore, claim 4 is further patentably distinguishable over the cited art.

Claim 5 adds the feature that the geometry and spacing of the features is such as to cause the liquid crystal material to adopt a locally homeotropic alignment.

Applicants respectfully submit that, as discussed above with respect to claim 3, the Masahiro patent fails to disclose or suggest liquid crystal material

adopting a locally homeotropic alignment, let alone such an alignment caused by the geometry and spacing of upstanding features, as in claim 5. Therefore, claim 5 is further patentably distinguishable over the cited art.

Claim 6 adds the feature that the features are at least one of shaped and orientated so as to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a single azimuthal direction.

Applicants respectfully submit that the Masahiro patent does not disclose or suggest features that are at least one of shaped and orientated so as to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a single azimuthal direction, as in claim 6. As discussed above with respect to claim 1, the Masahiro patent does not disclose or suggest upstanding features that produce a desired alignment, let alone features that are at least one of shaped and orientated so as to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a single azimuthal direction, as in claim 6. Therefore, claim 6 is further patentably distinguishable over the cited art.

Claim 7 adds the feature that the features are at least one of shaped and oriented to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a plurality of azimuthal directions.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest features that are at least one of shaped and oriented to produce one of a substantially uniform planar or tilted planar alignment of the liquid crystal director in a plurality of azimuthal directions. Similar to as in claim 6, the Masahiro patent fails to disclose or suggest features such as those in claim 7 which produce an a the specified alignment in a plurality of azimuthal directions. Therefore, claim 7 is further patentably distinguishable over the cited art.

Claim 8 adds the feature that the features comprise posts which are tilted with respect to the normal to the plane of the first cell wall.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest features comprising posts which are tilted with respect to the normal to the plane of the first cell wall. The Masahiro patent fails to disclose or suggest upstanding features that produce a desired alignment, let alone features comprising posts, as in claim 8. Therefore, claim 8 is further patentably distinguishable over the cited art.

Claim 10 adds the feature that the features are at least one of different height, different shape, different tilt and different orientation in different regions of the device.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest features that are at least one of different height, different shape, different tilt and different orientation in different regions of the device. As discussed above with respect to claim 1, the Masahiro patent fails to disclose or suggest upstanding features that produce a desired alignment, let alone features as described in claim 10. Therefore, claim 10 is further patentably distinguishable over the cited art.

Claim 11 adds the feature that the features comprise posts, and wherein a tilt angle and orientation of the posts are uniform throughout the device.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest features comprising posts, and wherein a tilt angle and orientation of the posts are uniform throughout the device. As discussed above with respect to claim 8, the Masahiro patent does not disclose or suggest posts, let alone posts of a uniform tilt angle and orientation, as in claim 11. Therefore, claim 11 is further patentably distinguishable over the cited art.

Claim 16 adds the feature that the inner surface of the second cell wall is treated to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall, whereby the cell functions in an STN mode.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest treating the second cell wall in any way, let alone in a manner to produce at least one of a locally planar or tilted planar alignment of the liquid crystal material substantially at right angles to the alignment direction on the first cell wall, whereby the cell functions in an STN mode, as in claim 16. Therefore, claim 16 is further patentably distinguishable over the cited art.

Applicants respectfully submit that the Masahiro patent fails to disclose a surface alignment structure on one surface of a wall for aligning the director of a liquid crystal material, the surface alignment structure comprising one of a random or pseudorandom two dimensional array of upstanding features which are at least one of shaped and orientated to produce the desired alignment, as in claim 15. As discussed above with respect to claim 1, the Masahiro patent does not disclose or suggest upstanding features that produce a desired alignment. For at least the reasons discussed above with respect to claim 1, claim 15 is patentably distinguishable over the prior art.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of said first cell wall providing a desired alignment to molecules of said liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and orientated to produce said desired alignment, and wherein the array of upstanding features is not treated with or formed from a material which will induce local homeotropic alignment of said liquid crystal material, as in claim

18. As discussed above with respect to claim 1, the Masahiro patent fails to disclose or suggest or suggest upstanding features that produce a desired alignment. Further, the Masahiro patent fails to disclose or suggest that such features not be treated with or formed from a material which will induce a local homeotropic alignment of the liquid crystal material. Therefore, claim 18 is patentably distinguishable over the cited art.

Applicants respectfully submit that the Masahiro patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of at least said first cell wall providing a desired alignment to molecules of said liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and orientated to produce said desired alignment, and wherein the molecules, when adjacent to the cell wall surface between the features, adopt an alignment which is one of planar and tilted planar, as in claim 19. As discussed above with respect to claim 1, the Masahiro patent fails to disclose or suggest upstanding features that produce a desired alignment. Further, the Masahiro patent fails to disclose or suggest that when the molecules are adjacent to the cell wall surfaces between such features, the molecules adopt an alignment which is one of planar and tilted planar. Therefore, claim 19 is patentably distinguishable over the cited art.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the Yasushi patent.

Applicants respectfully submit that the Yasushi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of a first cell wall providing a desired alignment to molecules of the liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and oriented to produce the desired alignment, and wherein the device

further includes an analyzer and a polarizer mounted on the cell walls, as in claim 9. As discussed above with respect to claim 1 and the Yasushi patent, the Yasushi patent fails to disclose or suggest the two dimensional array of upstanding features, as in claim 9. Further, the Yasushi patent fails to disclose or suggest an analyzer or a polarizer, let alone ones mounted on the cell walls, as in claim 9. Therefore, Applicants respectfully submit that claim 9 is patentably distinguishable over the cited art.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the Hiroshi patent.

Applicants respectfully submit that the Hiroshi patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of a first cell wall providing a desired alignment to molecules of the liquid crystal material, wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and oriented to produce the desired alignment, and wherein the device further includes an analyzer and a polarizer mounted on the cell walls, as in claim 9. As discussed above with respect to claim 1 and the Hiroshi patent, the Hiroshi patent does not disclose an alignment structure comprised of upstanding features, as in claim 9. Further the Hiroshi patent fails to disclose or suggest an analyzer or a polarizer, let alone ones mounted on the cell walls, as in claim 9. Therefore, Applicants respectfully submit that claim 9 is patentably distinguishable over the cited art.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over the Masahiro patent.

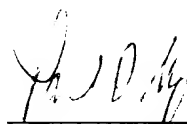
Applicants respectfully submit that the Masahiro patent fails to disclose or suggest a surface alignment structure integrated onto an inner surface of a first cell wall providing a desired alignment to molecules of the liquid crystal material,

wherein the surface alignment structure comprises one of a random or pseudorandom two dimensional array of upstanding features that are at least one of shaped and oriented to produce the desired alignment, and wherein the device further includes an analyzer and a polarizer mounted on the cell walls, as in claim 9. As discussed above with respect to claim 1 and the Masahiro patent, the Masahiro patent fails to disclose or suggest upstanding features that produce a desired alignment. For at least the reasons discussed with respect to claim 1, Applicants respectfully submit that claim 9 is patentably distinguishable over the cited art.

Accordingly, Applicants respectfully submit that all claims presented in this application patentably distinguish over the prior art. Therefore, Applicants respectfully request favorable consideration and passage of the application to allowance.

Respectfully submitted,

May 27, 2003



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